

30. The method of claim 24, wherein the plasma is generated by delivering a power level of between about 10 watts and about 500 watts to the processing chamber.

REMARKS

This is intended as a full and complete response to the Final Office Action dated June 5, 2001. Claims 1, 3-8, and 10-30 are pending in the application. Please reconsider the claims for reasons discussed below.

Claims 1, 3-5, 6, 7, 24, 25, and 27-30 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Konecni et al.* (EP 0849 779 A2). The Examiner maintains the rejection that although *Konecni* does not specifically disclose the percent by volume of argon, it is well known that etching parameters, such as etchant concentration, temperature, and flow rate, affect both the rate and quality of the plasma etching process. The Examiner, therefore, asserts that it would have been obvious to adjust *Konecni's* etchant concentration by optimizing the same using routine experimentation for the purpose of obtaining the best result.

Applicants respectfully traverse the rejection. *Konecni et al.* teaches a plasma generated from a gas comprising 80% by volume of argon (a hydrogen flow rate of 1 sccm with an argon flow rate of 4 sccm). (See, *Konecni et al.* at col. 3, lines 55-59.) Therefore, *Konecni et al.* does not teach a plasma generated from a gas mixture consisting of argon, helium, and hydrogen, wherein the gas mixture comprises less than about 75% by volume of argon, as recited in claim 1 and those dependent therefrom.

Applicants also submit that the Examiner ignored the Applicants' previous submission of surprising and unexpected results. As stated in Applicants' previous response, the claimed invention provides a method for processing a substrate in a processing chamber that enhances the etch rate of the substrate by exposing the substrate to a plasma generated from a gas mixture consisting of argon, helium and hydrogen, wherein the gas mixture comprises less than about 75% by volume of argon. (See, specification at page 5, lines 24-31 and Figure 4.) As shown in Figure 4 of the application, the etch rate actually increases as the volume of argon decreases from

75% by volume to 25% by volume. This correlation is contrary to expectations. One would have expected the etch rate to decrease as the volume of argon decreased. Therefore, Applicants submit that it would not have been obvious in light of *Konecni et al.* to arrive at the claimed invention. Accordingly, Applicants submit that the rejection was improper and respectfully request withdrawal of the rejection.

Claims 8 and 10-23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Konecni et al.* (EP 0849 779 A2) in view of *Jen* (U.S. Patent No. 5,773,367). The Examiner maintains the rejection that although *Konecni* does not specifically disclose the step of increasing the helium content of the plasma to increase etching of the patterned substrate surface, *Jen* discloses a method of plasma etching an oxide layer comprising the step of increasing the helium flow rate (content) to increase the etch rate of the patterned oxide surface. (See, col 6, lines 4-9 and Fig. 7A). The Examiner therefore asserts that it would have been obvious to modify *Konecni's* process by adding the step of increasing the flow rate (content) of helium to increase the etch rate of the patterned oxide surface as per *Jen* because *Konecni* states that bombardment of a material with inert ions (helium) increases the reactive surface area of the material accessible to reactive hydrogen ions. (See, col 7, lines 5-8).

Applicants respectfully traverse the rejection on grounds that the Examiner has not established a *prima facie* case of obviousness. *Konecni* has been distinguished above. *Jen* discloses a three step etching process wherein each step includes a varying amount of helium, freon, and oxygen. (See, *Jen* at col. 1, line 43 through col. 2, line 60.) Contrary to the Examiner's assertion, Figure 7A of *Jen* shows a decrease in oxide etch rate as the flow rate of helium increases from 90 sccm to 100 sccm. Therefore, the Examiner's motivation for combining the references is neither technically nor legally accurate. In addition, Figure 7A merely shows the oxide etch rate at different helium flow rates. The Examiner has erroneously read into the reference that the helium flow rate was increased during the oxide removal process. There is no evidence to support the Examiner's conclusion. Therefore, not all claim limitations are taught or suggested by the prior art which is a requirement to establish a case of *prima facie* obviousness. See, *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). The references in combination do not teach, show, or suggest increasing the helium content

to increase etching of the patterned substrate surface, as recited in claims 8, 14, and those dependent therefrom. Accordingly, Applicants respectfully request withdrawal of the rejection and allowance of the claims.

In conclusion, the references cited by the Examiner, neither alone nor in combination, teach, show, or suggest the claimed invention. Having addressed all issues set out in the office action, applicants respectfully submit that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,



Robb D. Edmonds
Registration No. 46,681
THOMASON, MOSER & PATTERSON, L.L.P.
3040 Post Oak Blvd., Suite 1500
Houston, TX 77056
Telephone: (713) 623-4844
Facsimile: (713) 623-4846
Attorney for Applicant(s)